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FOR NETWORK PROCESSORS
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FIG. 1

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FIG. 2

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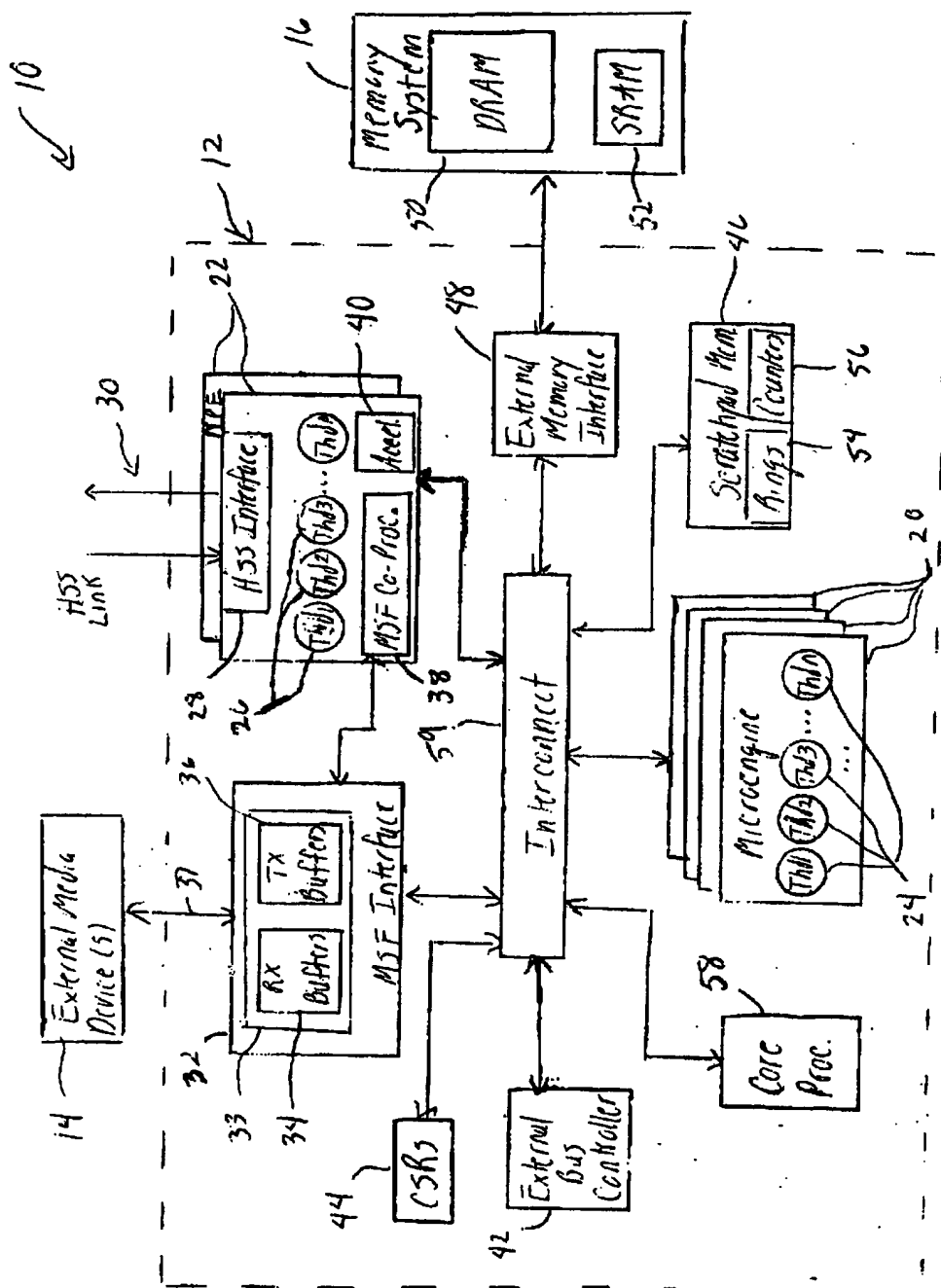Muthu Venkatachalam et al.
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FIG. 3A

FIG. 3B

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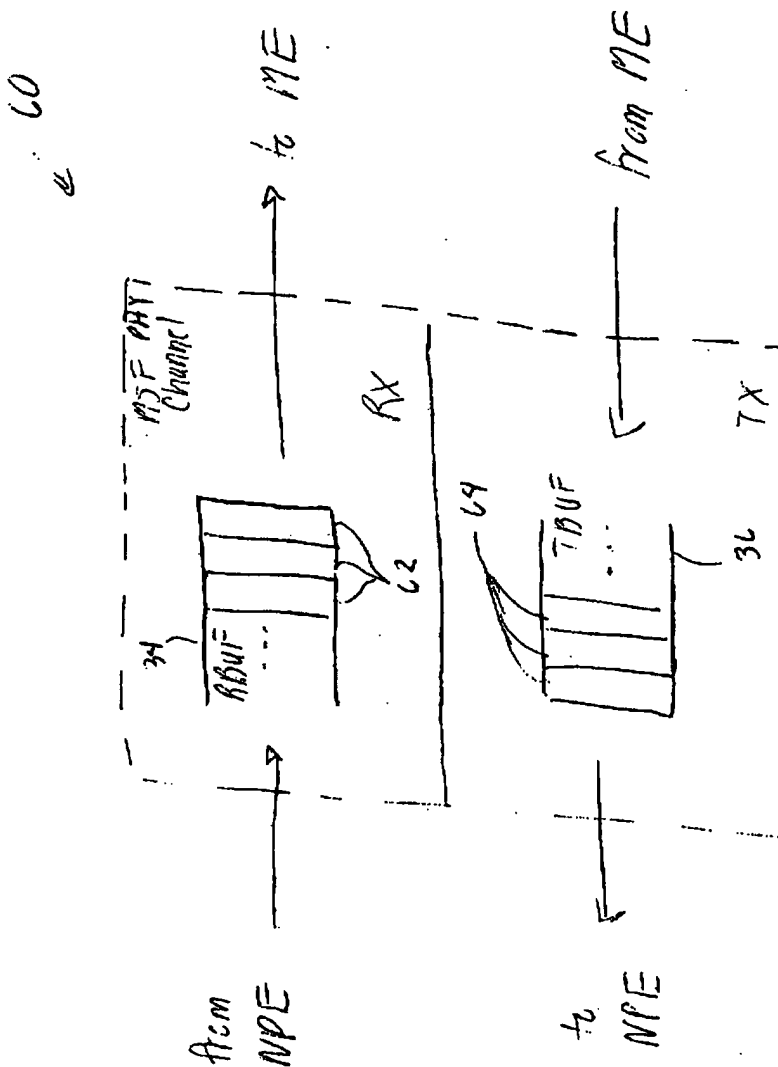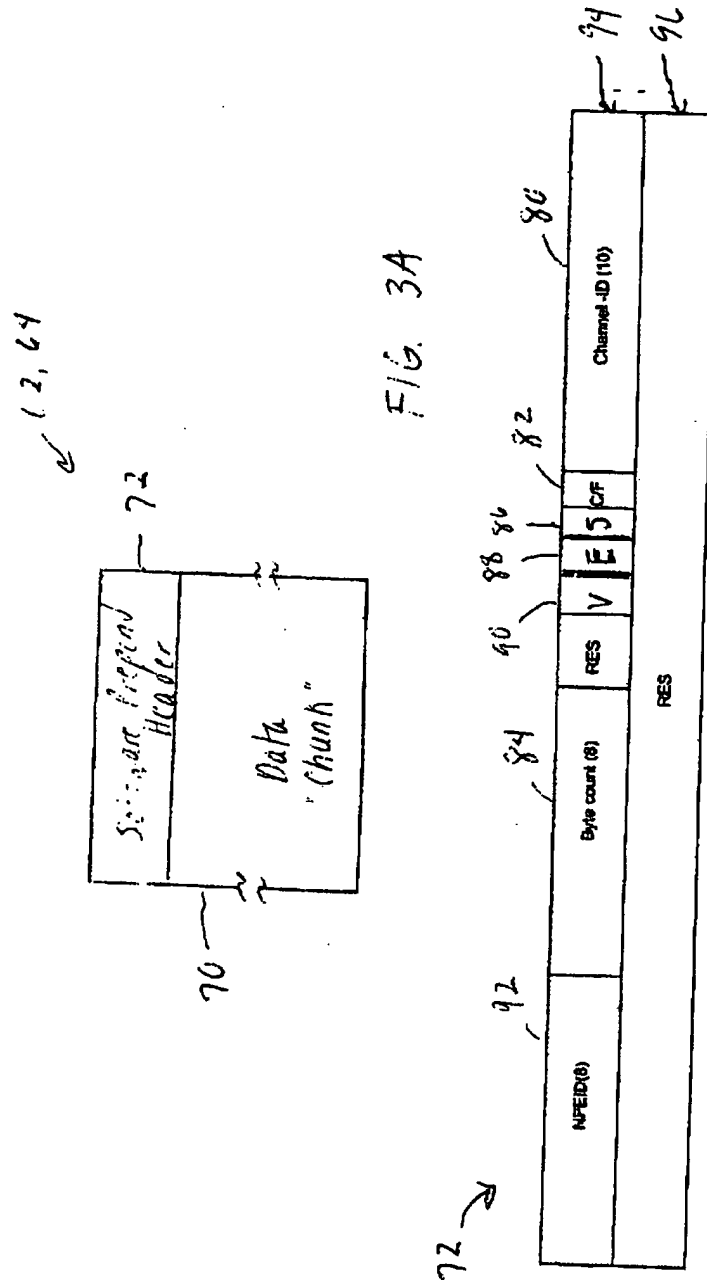Muthu Venkatachalam et al.
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/ 100

NPE receives data for a
channel from line-receive
hardware (e.g., HSS
coprocessor) — 102

NPE processes and
reassembles frame-based
protocol data — 104

End of frame
received? — 106 — Yes

No

programmed # of bytes
for this channel
reassembled? — 108 — No

Yes

NPE composes software
prepend header, setting all
fields correctly — 110

NPE transmits prepend
header and frame data to
MSF RBUF element — 112

ME receive driver thread is
awakened by MSF, and thread uses
the prepend header in the RBUF
element to process the frame data
(also in the RBUF element). — 114

Following completion of
processing, ME receive
driver thread goes to sleep
to await another RBUF
element from MSF — 116

FIG. 4

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120

NPE receives data for a channel from line-receive hardware (e.g., HSS coprocessor) — *122*

NPE processes and reassembles cell-based protocol data — *124*

Entire cell received? — *126*

No

Yes

NPE composes software prepend header, setting all fields correctly — *128*

NPE transmits prepend header and cell data to MSF RBUF element — *130*

ME receive driver thread is awakened by MSF, and thread uses the prepend header in the RBUF element to process the cell data (also in the RBUF element). — *132*

Following completion of processing, ME receive driver thread goes to sleep to await another RBUF element from MSF — *134*
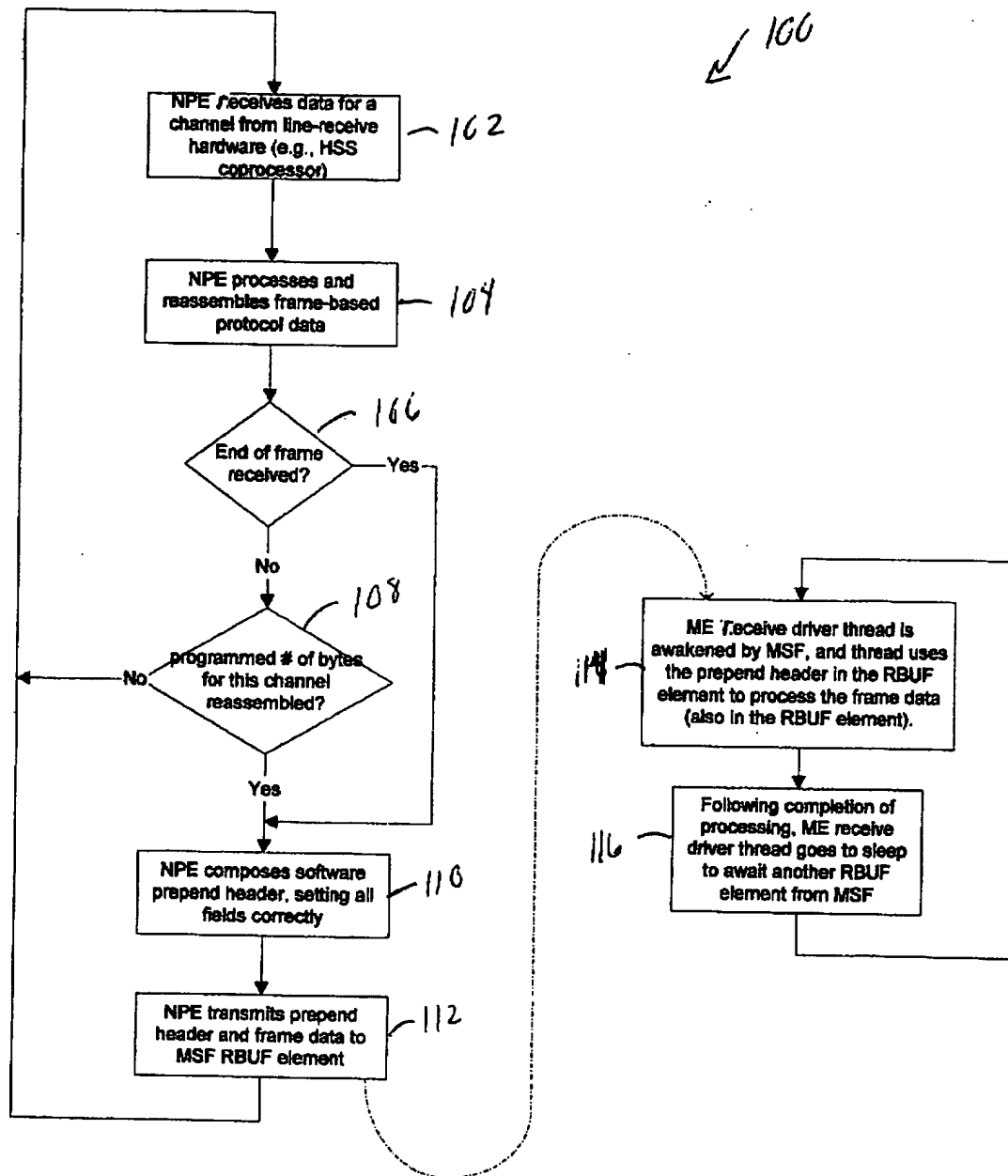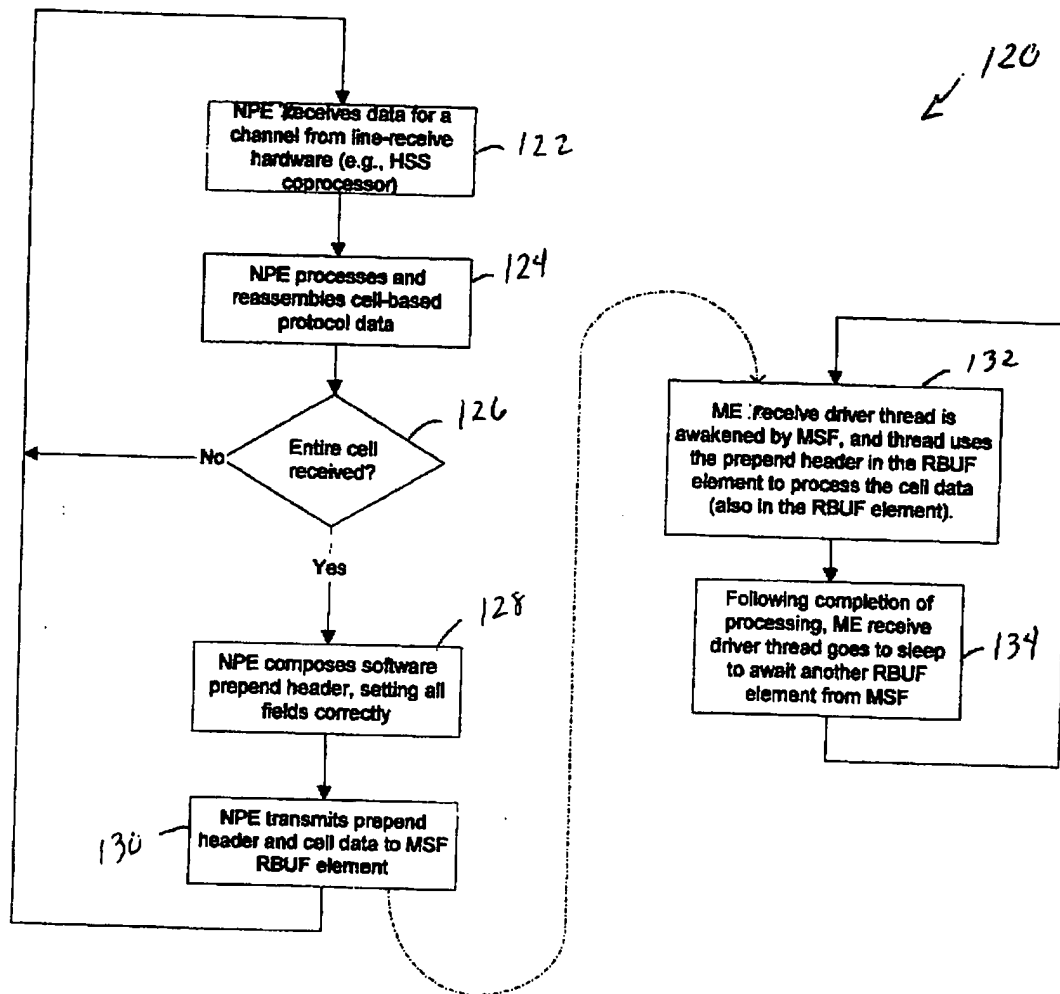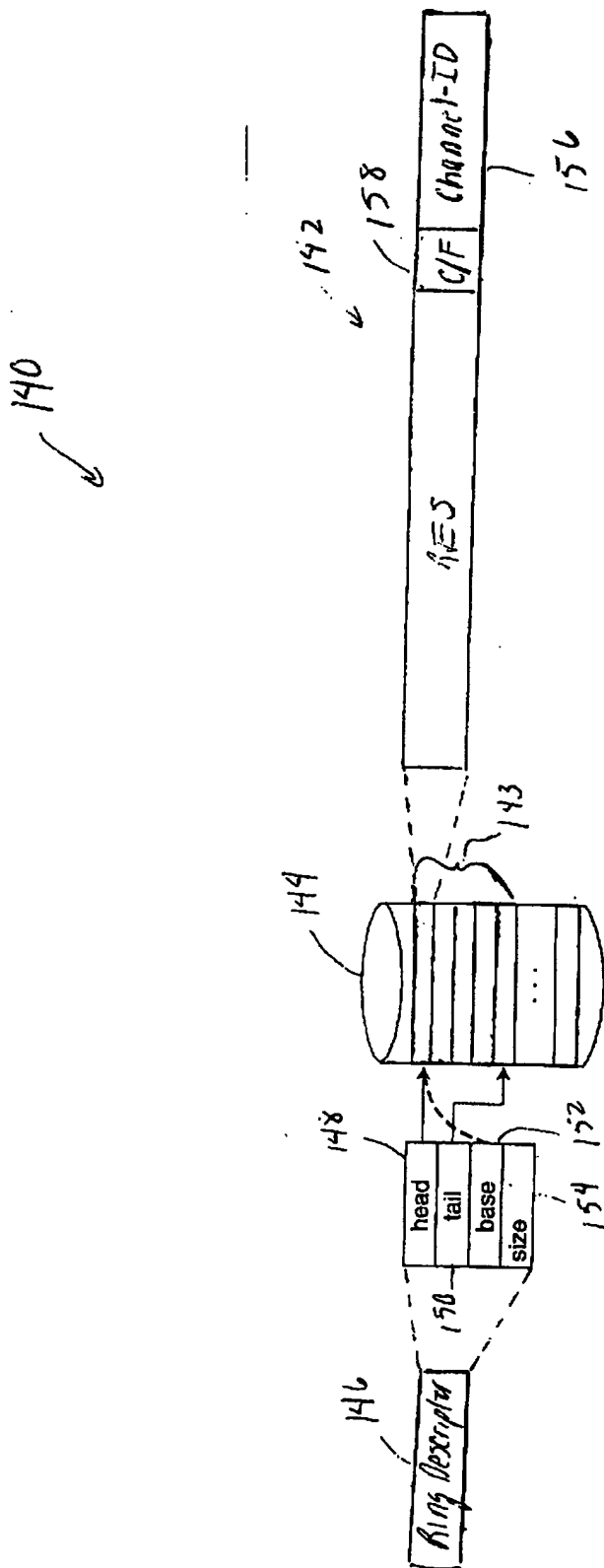
FIG. 5

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FIG. 6

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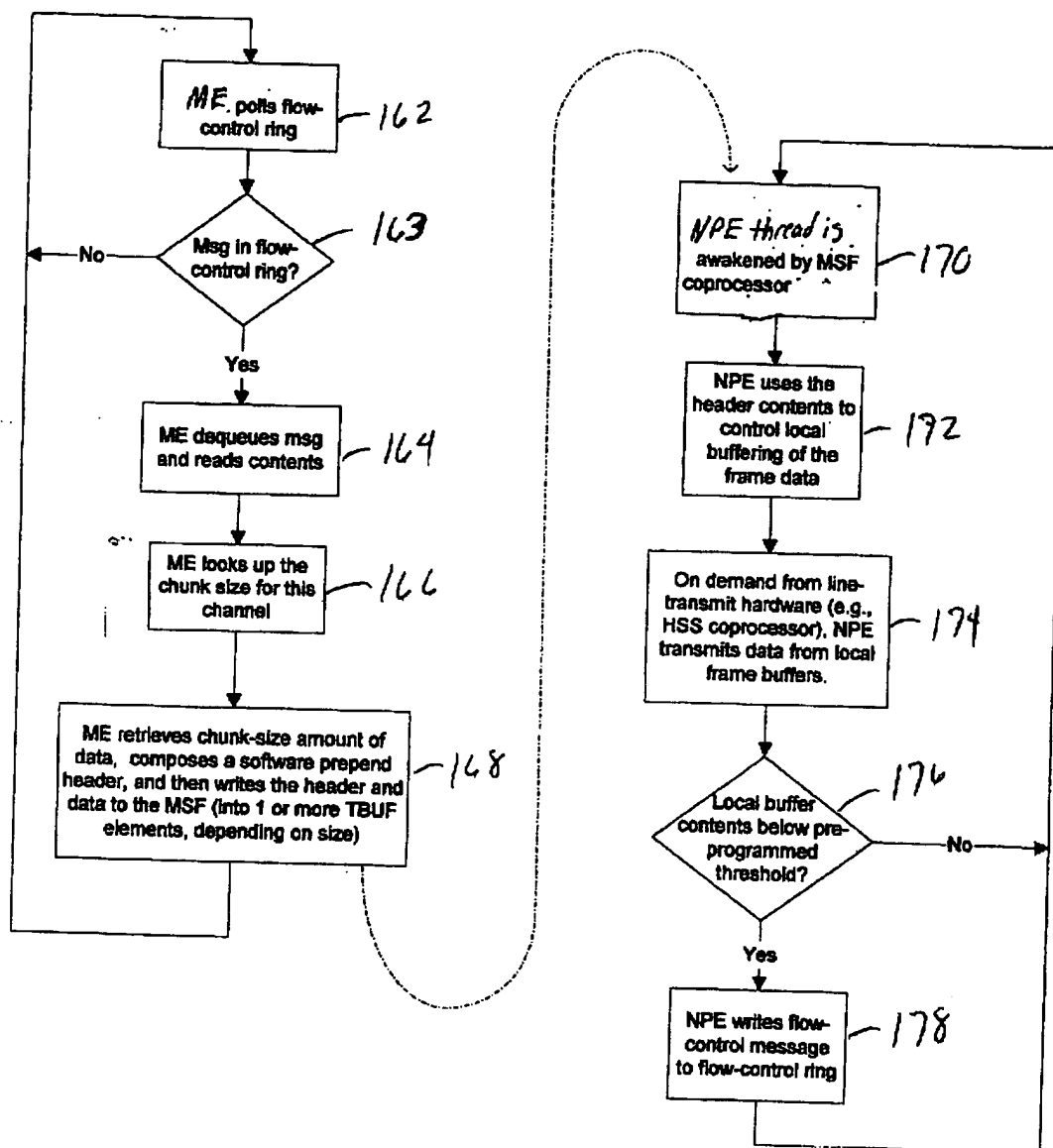Muthu Venkatachalam et al.
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160

ME polls flow-control ring —162

Msg in flow-control ring? 163 — No

Yes

ME dequeues msg and reads contents —164

ME looks up the chunk size for this channel —166

ME retrieves chunk-size amount of data, composes a software prepend header, and then writes the header and data to the MSF (into 1 or more TBUF elements, depending on size) —168

NPE thread is awakened by MSF coprocessor —170

NPE uses the header contents to control local buffering of the frame data —172

On demand from line-transmit hardware (e.g., HSS coprocessor), NPE transmits data from local frame buffers. —174

Local buffer contents below pre-programmed threshold? 176 — No

Yes

NPE writes flow-control message to flow-control ring —178

FIG. 7

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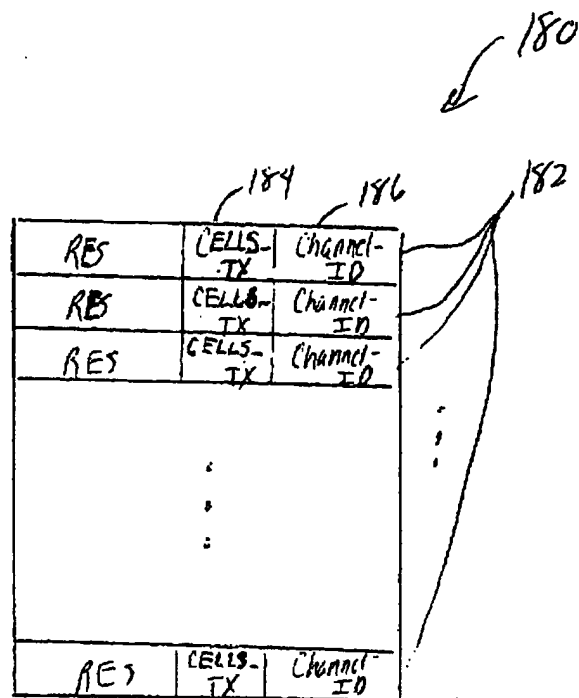| RES	CELLS-TX	Channel-ID
RES	CELLS-TX	Channel-ID
RES	CELLS-TX	Channel-ID
RES	CELLS-TX	Channel-ID

FIG. 8

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190

192

ME polls flow-
control location for a channel
and computes "cells in flight"

194

"cells in flight"
< threshold? — No

Yes

196

ME retrieves one cell of data,
composes a software prepend header,
and then writes the header and data to
the MSF (into 1 TBUF element)

198

NPE thread, is
awakened by MSF
coprocessor hadware

200

NPE uses the
header contents to
control local
buffering of the
cell data

202

On demand from line-
transmit hardware (e.g.,
HSS coprocessor), NPE
transmits cell data from
local buffers.

204

Has an entire cell
be transmitted? — No

Yes

206

NPE updates cells-
transmitted count and
writes the count to flow-
control location for this
channel

FIG. 9

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FIG. 10A

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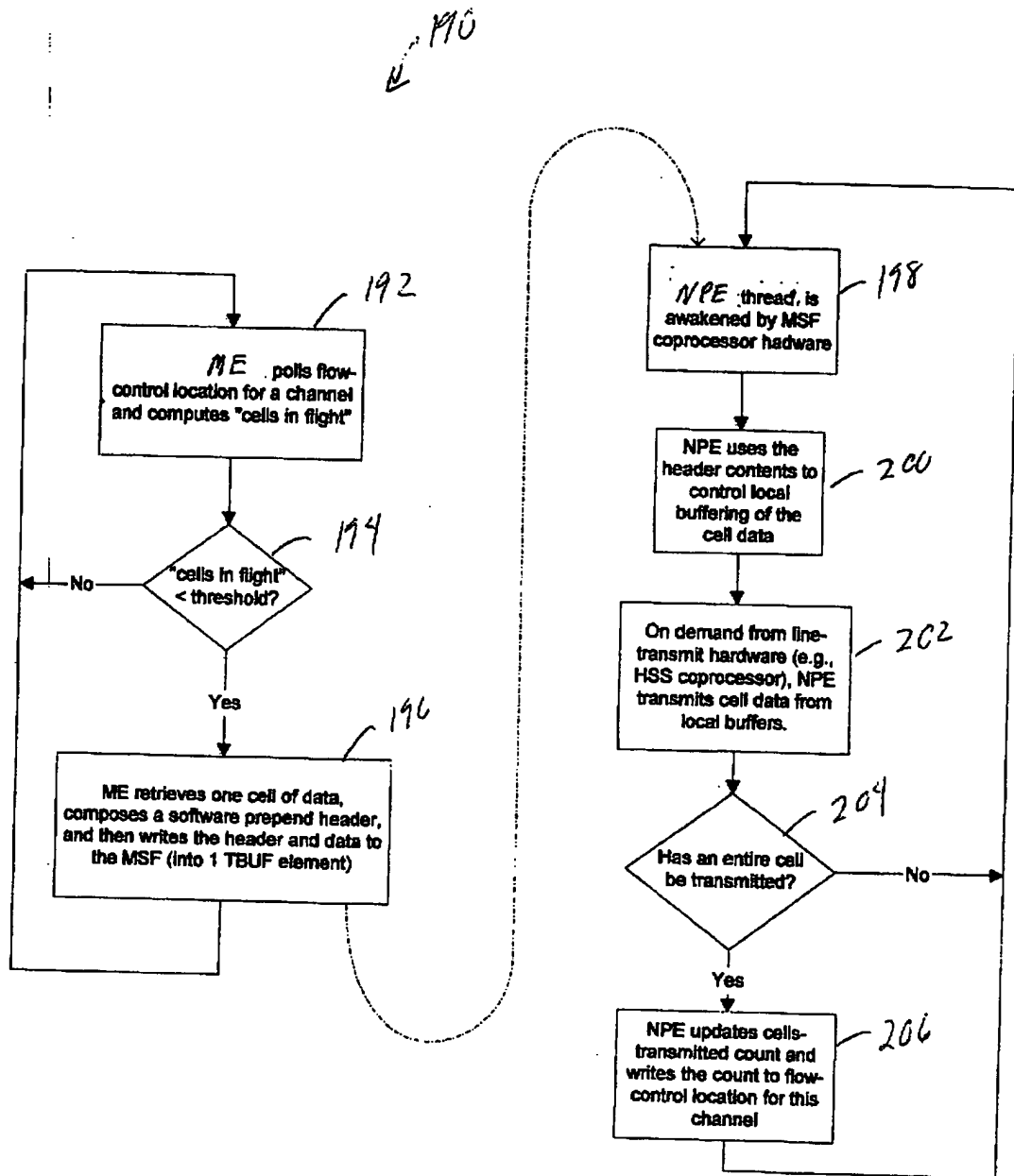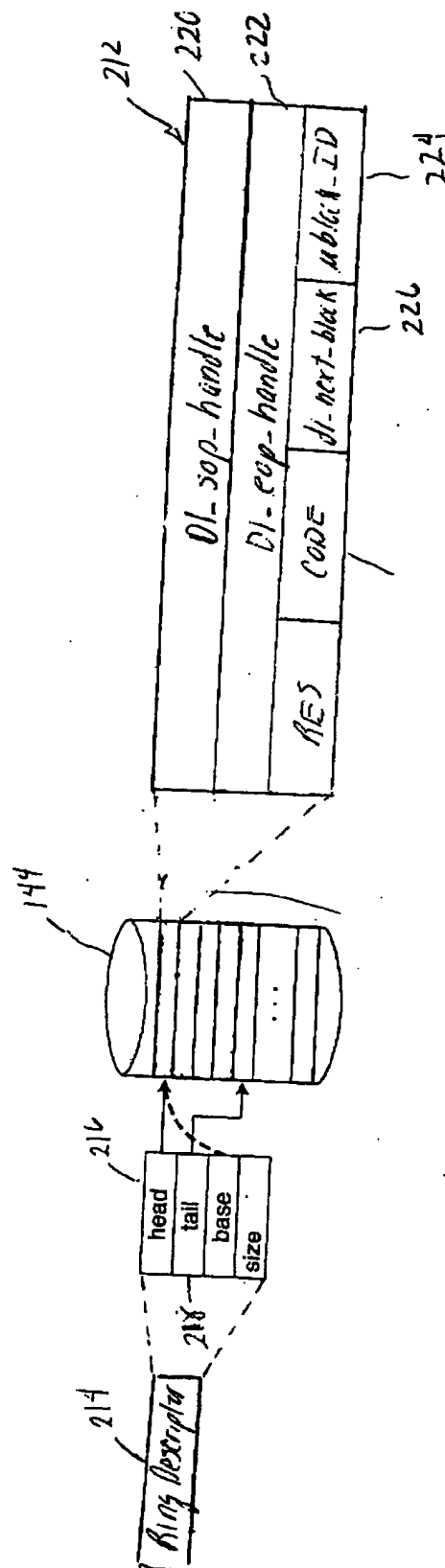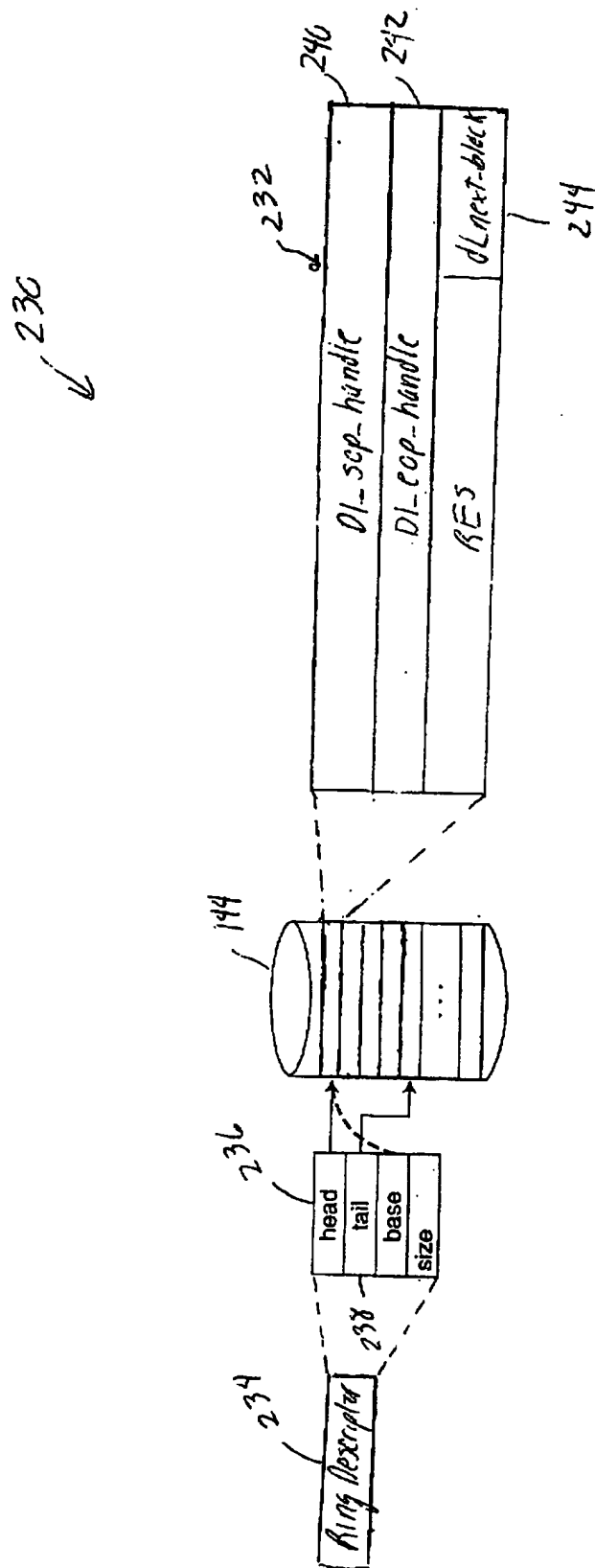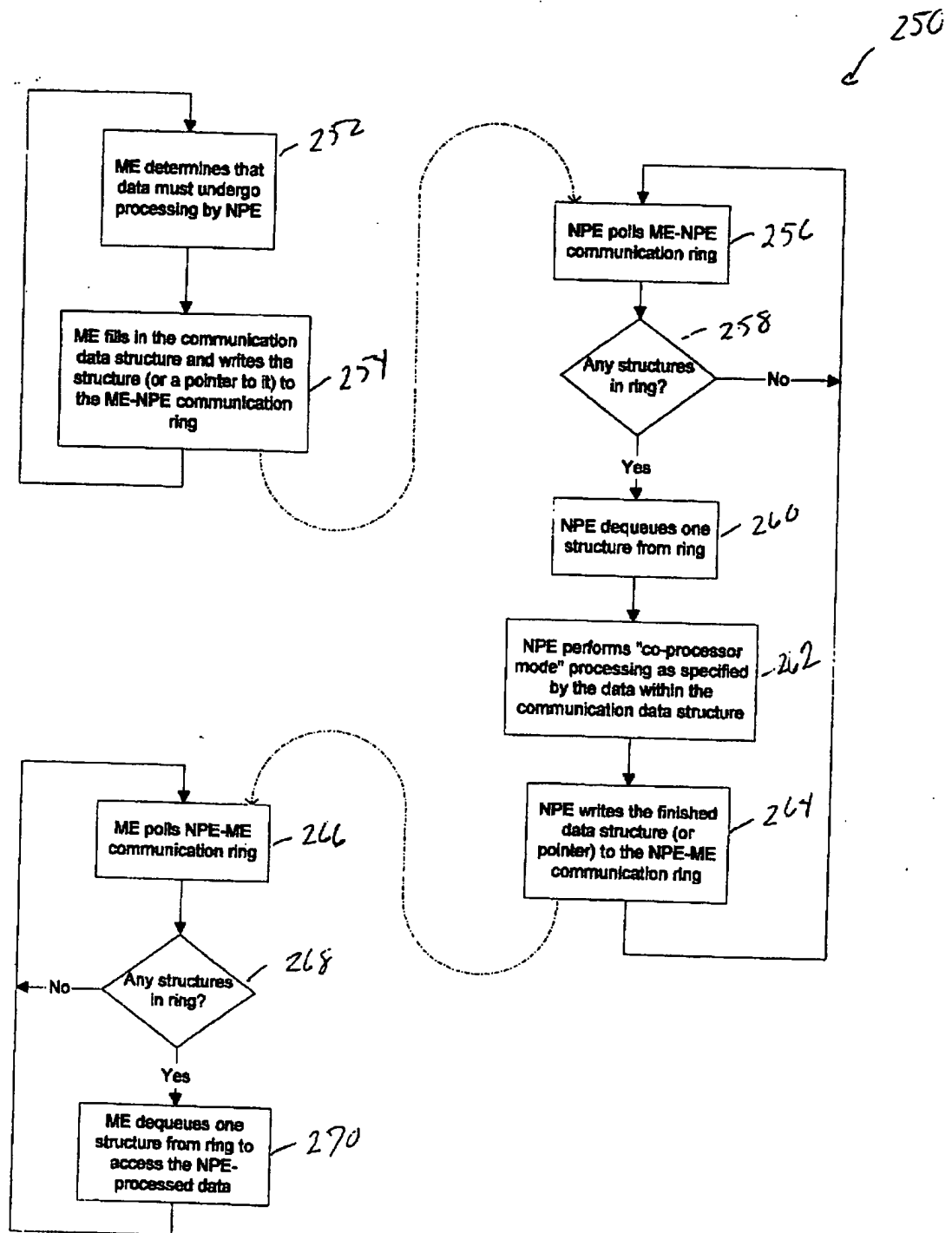Muthu Venkatachalam et al.
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FIG. 10B

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250

ME determines that
data must undergo
processing by NPE — 252

ME fills in the communication
data structure and writes the
structure (or a pointer to it) to
the ME-NPE communication
ring — 254

NPE polls ME-NPE
communication ring — 256

Any structures
in ring? — 258 — No

Yes

NPE dequeues one
structure from ring — 260

NPE performs "co-processor
mode" processing as specified
by the data within the
communication data structure — 262

NPE writes the finished
data structure (or
pointer) to the NPE-ME
communication ring — 264

ME polls NPE-ME
communication ring — 266

Any structures
in ring? — 268 — No

Yes

ME dequeues one
structure from ring to
access the NPE-
processed data — 270

FIG. 11

MICROENGINE TO NETWORK PROCESSING ENGINE INTERWORKING
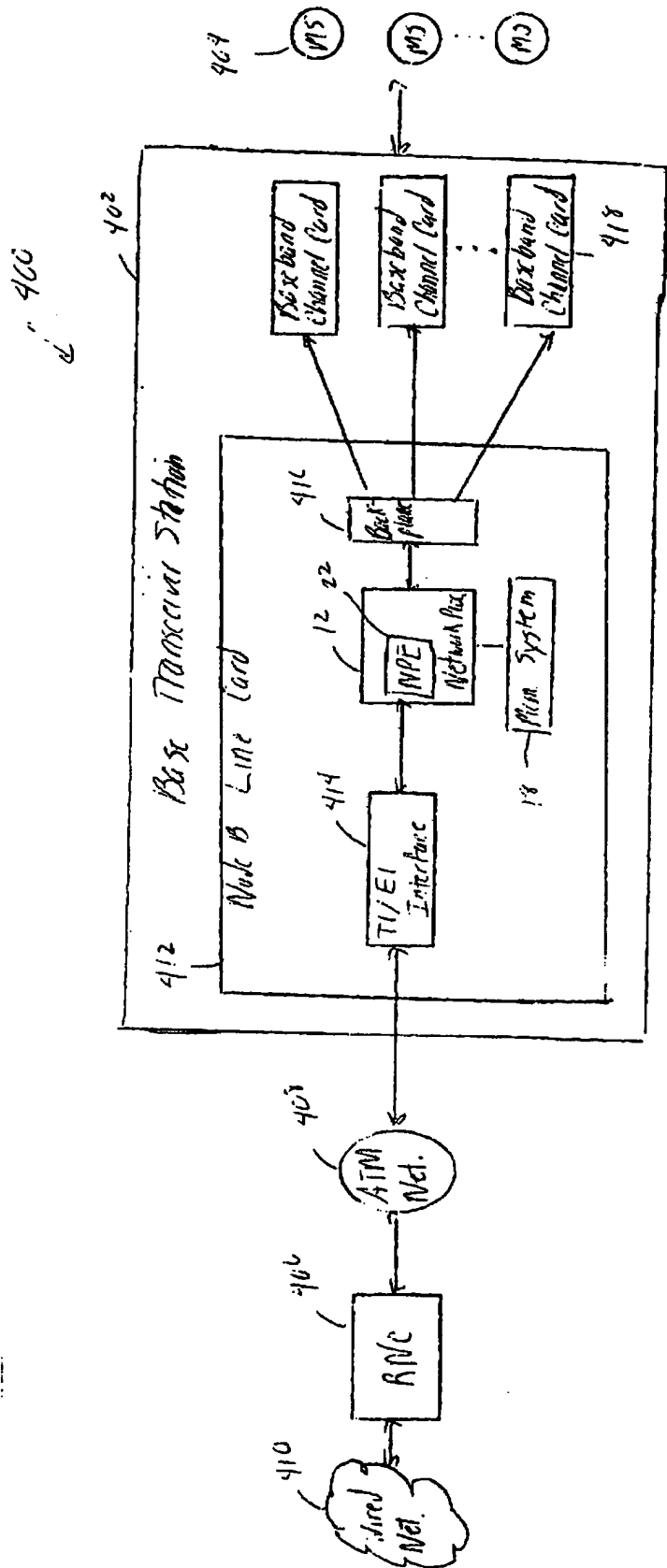FOR NETWORK PROCESSORS
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FIG. 12